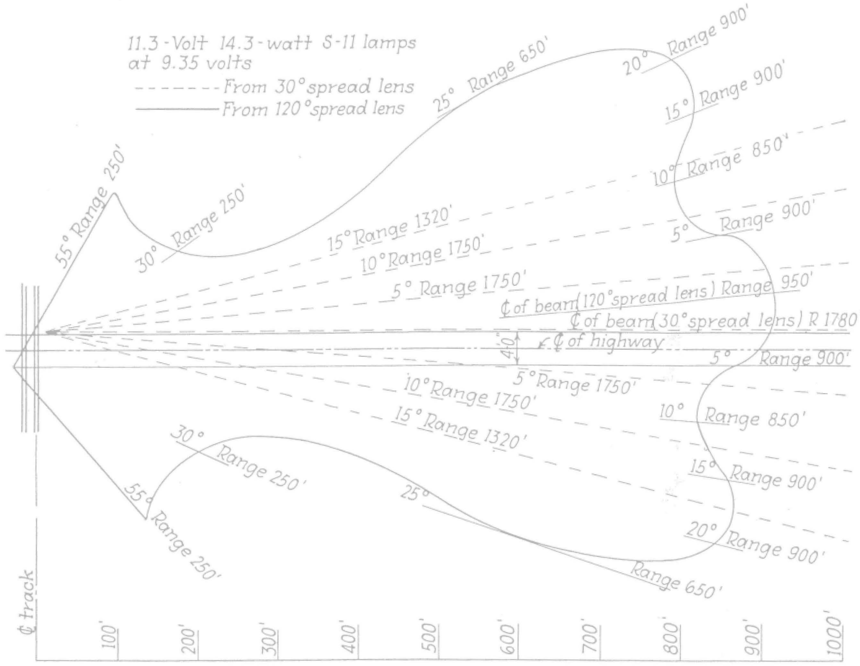
the necessity of installing long-range signals and special spread lenses so that signals are visible throughout the entire highway approach.

The arrangement of signals recommended by the Association of American Railroads, and adopted by most roads as standard, in which the signals are arranged to indicate in both directions along the highway, permits the use of one type of long-range spread lens on the front light and a wider type of spread lens on the back light.

The accompanying diagram plotted from manufacturer's curves shows the approximate range and spread of signals in which a 120-deg. spread lens is used on the back light and 30-deg. spread lens on the front light. The location shown is typical for a long tangent approach, and the focusing of signals should be adjusted to meet local conditions at individual locations, allowance being made for curved highway approaches. The ranges for the various degrees of spread shown are approximate values.



Distribution of beam with the range at various angles from the flasher units

With a tangent highway approach as illustrated, the long-range front lights can be sighted from the highway in bright daylight at a distance of approximately 1,780 ft. from the crossing, and the back lights at a distance of approximately 950 ft. The spread of a back-light beam is such that a good indication can be observed over the entire width of the crossing. This wide spread is particularly desirable when cars are stopped opposite the signal on the approach side of the crossing, where there are two or more lanes in the one direction and where a car in the right-hand lane might obstruct the view of the signal to the right of the highway.

### Drawing Illustrates Method

*C. J. Kelloway*
Superintendent of Signals, Atlantic Coast Line, Wilmington, N.C.

The best answer that we can give to the question of how to direct the flashing-light units of a crossing signal having 30-deg. spread lenses, is indicated on the plan herewith. The dotted lines represent the central beams, each of which is directed toward an automobile approaching the crossing at a distance of 400 ft. The back lights are also directed toward these points on the opposite sides in order to obtain the maximum benefit from these auxiliaries. The essential dimensions are shown in the diagram.

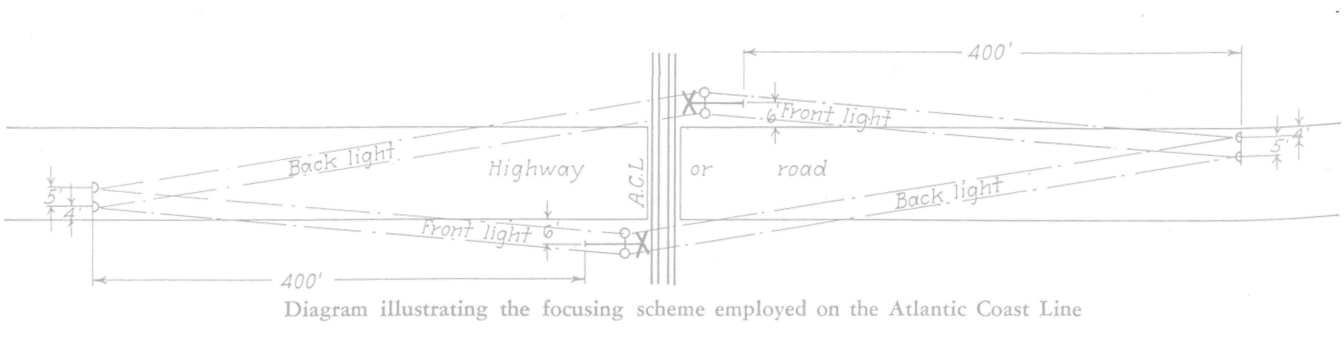


Diagram illustrating the focusing scheme employed on the Atlantic Coast Line

# Checking Signal Lamps

*"On approach-lighted signal territory where it is important not to shunt the track because of interfering with train operation, what means do you use to check filaments in signal lamps?"*

### Use Dry Cells in Testing

*E. B. Luse*
Signal Maintainer, Great Northern, Ephrata, Wash.

In testing filaments of signal lamps I use dry cells and lead wires fitted with testing clips. The clips are connected at the light socket and the two cells connected in series, giving sufficient voltage to illuminate the filament.

Although this voltage does not give full brilliancy there is usually enough light to indicate, upon close inspection, whether both filaments are burning, in case there are two. Also the lower voltage relieves the eyes of the discomfort caused by looking on a bright filament as in regular signal operation.

By testing signal lights in this manner there is no danger of stopping trains or of tying up interlockings, by using shunts.

### DNL Relay Shunted

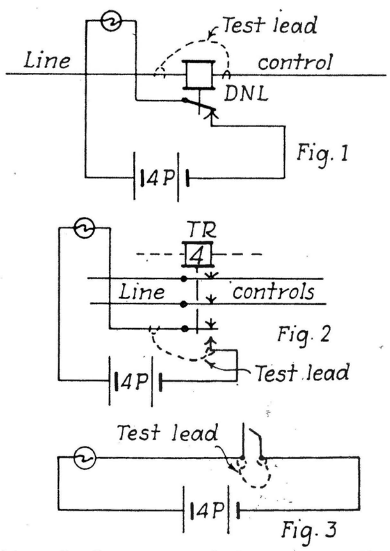
*Vernon C. Cone*
Signal Maintainer, Southern Pacific, El Paso, Tex.

Testing signal lamps in approach-lighting territory without shunting the track is not a difficult operation. For
*(Continued on page 602)*

this work I have used the following methods, and find them very convenient.

For use in testing I always carry several test leads made of flexible wire, with clips on both ends for making temporary connections. These can be used in testing signal lamps as illustrated. In Fig. 1, the lamp is controlled by a series-connected line DNL relay. The relay coils are shunted as shown, testing the operation of the relay and the lamp; the shunt wire remains connected while the lamp is being observed. In Fig. 2, the lamp is controlled through a back contact of the track relay in the approach section. This is also easily tested as shown.

In Fig. 3, the lamp is controlled through a circuit breaker on a signal



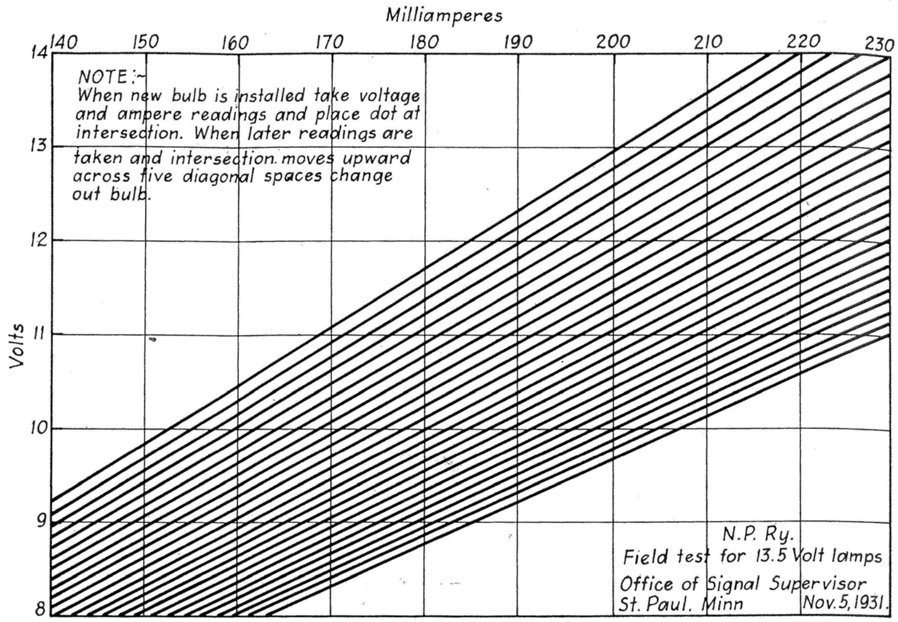

**Test leads are used in temporarily lighting the light for checking filament**

mechanism. This lamp is tested in the same way by bridging the circuit breaker with the test lead and observing the lamp. These leads are very handy for this purpose, especially where it is necessary to climb up on the semaphore signals to see the lamp burning.

## Ammeter Usually Employed

*A. G. Nutting*
Supervisor of Signals, Northern Pacific, St. Paul, Minn.

Under the conditions mentioned in the question we usually take readings with an ammeter which, in nearly all cases, can be applied to the back-contact terminals of the relay which lights the lamp. This of course, does not require any disconnections in circuits. This test checks against high-resistance lamp filaments and also against sagging filaments. A high-resistance filament would indicate a very old lamp or something that was developing in the filament, which would lead to a failure. The sagging filaments usually have several turns of the filament wire shorted out, resulting in a higher current consumption and the remaining portion of the filament burning at a higher candle-power, which shortens the life of the lamp.




**This diagram can be used in establishing lamp life**

In addition to checking lamps as above, we have a practice in semaphore signal territory, where the 16-cell motor battery energizes the motor, hold-clear coil and line circuits, to change out the lamp with every second battery renewal. At other locations, where separate line battery or a separate hold-clear battery is used, the lamp is changed out with every renewal of the motor battery.

The volts vs. amperes diagram, which I worked out at one time, held good for a certain manufacturer's type of lamp, but in later years, owing to different types of lamps being furnished and different processes of manufacture, I discontinued the use of it. However, I found this test to be very interesting. The principle in mind was that the longer the lamp was in service the less current the filament would take, which was caused by the filament decreasing in size as a result of its use.

Lamps can also be inspected in daytime by placing a piece of white paper behind them. The amount of filament burned off, being deposited on the inside of the glass, darkens it. The darker the glass shows up on the white background, the older the lamp.

I would consider the best practice to be to change out the lamps at some time less than the average rated life, which eliminates most of the lamp failures. And then again, by installing a new lamp at the time the battery is renewed, the peak voltage would burn out any defective lamps at the time. After this peak voltage is off the battery there are very few lamp failures.

# Flashing Aspects

*"What types of practical devices are available for use in flashing a signal lamp to provide a different aspect from a steadily-burning lamp of the same color?*

## Flasher Relay on Order Board

*P. M. Gault*
Signal Engineer, Missouri Pacific
St. Louis, Mo.

The only flashing device with which we have had any experience is the so-called flashing relay, which we use in all of our flashing-light crossing signals and in a great many of our train-order signals to distinguish them from interlocking or automatic signals located nearby.

## Flashing Plug Utilized

*R. D. Moore*
Signal Engineer, Southern Pacific
San Francisco, Cal.

Where we use a flashing-light unit to provide a different aspect from a steadily-burning unit of the same color, we are using a General Electric Wynk-A-Lyte flashing plug. These have proved to be satisfactory for our purposes.

*(Continued on page 604)*